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More drinking water for San Diego

By David Schubert
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Like many communities throughout the world, San Diego has a drinking problem. However, rather than intoxicating alcohol, the problem is toxic pharmaceuticals and consumer goods such as cosmetics that make their way into our drinking water supply from homes, hospitals, businesses and farms.

They primarily pass through sewage (wastewater) systems with only partial removal. The treated wastewater is released into rivers and lakes and ends up in downstream water supplies, like San Diego's. While the concentrations of individual toxins in drinking water is often quite low, there is growing evidence that the amounts are sufficient to cause reproductive problems in aquatic animals and to lead to antibiotic resistance in pathogenic bacteria.

Although scientists and government health agencies have known about this problem for nearly 20 years, little has been done in the United States to stem the flow of these toxins into the environment. It seems to have taken a recent, widely publicized investigation by the Associated Press to raise public concern.

The appearance of pharmaceuticals in rivers, lakes and streams was first reported in Europe in the early 1990s. It was initially believed that these chemicals came exclusively from manufacturing facilities, and indeed some of them did. However, further investigation showed that the majority came from the effluents of community wastewater treatment plants.

Using standard treatment regimes, most of the toxins entering treatment plants are released into the environment in the treated wastewater. The geology of Europe makes the water circulation there more of a closed system than in most other parts of the world.

In some cases, half of the volume of a river is from treated wastewater. Since it is difficult to remove toxins during the subsequent preparation of municipal drinking water, there has been an intense effort in Europe to improve the sewage treatment facilities such that most of the toxins are removed before discharge.

This has not happened in the United States. With a growing population, greater water reuse along the rivers that supply our drinking water, and an overall decrease in the volume of our water supplies, there has been a significant increase in concentrations of toxins in many of our waterways, ground waters and in the drinking water of San Diego.

How can this trend be reversed to eliminate a very real threat to public health? San Diego receives most of its water from the Sacramento River Delta area near San Francisco and from the Colorado River.

Water flowing through the Delta includes agricultural runoff (chemicals and pesticides) and municipal wastewater discharges from cities such as Sacramento. Colorado River water has passed through multiple cities, including Las Vegas, which draws its water from Lake Mead and then discharges reclaimed water back into the lake, which flows into the Colorado River for our downstream consumption.

The best way to reduce the toxin problem along these waterways, as well as at the national level, is to follow the example of Europe and try to remove 80 percent to 90 percent of the toxins at the wastewater treatment facilities. This approach requires a longer retention time in the biological treatment step used by wastewater treatment plants to allow for the degradation of toxins by microbes and oxidation. It also places an additional cost on the operation of these plants, but this is a cost that society should be willing to pay.

However, the only truly effective way of removing the vast majority of these toxins from our drinking water supply is via the technology currently being proposed for San Diego's poorly named "toilet-to-tap" program. The toilet-to-tap program was created because it is imperative that San Diego find other sources of water besides the Sacramento River Delta and the Colorado River.

The Delta water supply is subject to elimination by an earthquake or a judicial cutback due to a threatened species such as the Delta smelt. Some have estimated that at the current rate of consumption Lake Mead will be dry by 2021, and the water transport system from the Colorado River to San Diego is also subject to earthquake damage.

Since local groundwater supplies are few and of limited volume, alternative water sources for San Diego are very limited. These include seawater desalination, planned for Carlsbad, and reclaimed water, which is taken from treated wastewater.

Reclaimed water is already used in San Diego for landscape watering. This water is heavily chlorinated, so if the reclamation plant is functioning properly, there is minimal risk of infection. But it does contain significant levels of toxins and other contaminants.

For the toilet-to-tap project, this reclaimed water would be taken through three additional purification steps: micro-filtration and reverse osmosis, followed by exposure to a strong oxidant or high intensity ultraviolet light. These extra steps reduce the toxins to undetectable levels, creating essentially pure water. It is so pure that it cannot be used for agriculture unless minerals are added back into it, for example by diluting it into imported water in the San Vicente reservoir.

The purification procedures for the proposed San Diego drinking water program are already being used to recharge the drinking water aquifers under Orange County with advanced treated reclaimed sewage water. Singapore has installed a similar recycling system, called NEWater, so that it is not dependent upon Malaysia for its water supply.

For San Diego to become less dependent upon imported water, it is mandatory that it creates other sources. The production of ultrapure water from our wastewater facilities is a step in this direction, and it should be supported along with conservation and seawater desalination. Perhaps only through these measures will we be able to continue to enjoy a healthy life in a coastal desert.